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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,728	08/28/2001	Robert G. Dandrea	DIVA 312	5136

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EXAMINER

CHOI, WOO H

ART UNIT	PAPER NUMBER
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2186

DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,728

Applicant(s)

DANDREA, ROBERT G.

Examiner

Woo H. Choi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☒ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2.3.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 23 is objected to because of the following informalities:

Claim recites the limitation “parity group containing the failed disk drive”. A parity group as disclosed contains extents and segments but does not “contain a disk drive”. This limitation will be interpreted as “parity group containing the extent stored in the failed disk drive”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 8, 16, and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

4. With respect to claim 8, the claim requires that the first (data) parity segments generating step store parity information in each extent of the parity group. However, the specification discloses that the data parity segment is not stored in one of the extents (extent 3 in figure 4). If the limitation “generating said parity segments” was meant to encompass both generating steps

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claimed in the parent claim, the claim is still problematic under 35 U.S.C. 112, second paragraph, for being indefinite for not being clear (not clear as to which generating step or steps, also the limitation “further comprises” is for a single step).

5. With respect to claim 16, the specification does not describe an embodiment where the second parity segment (parity of parity segment) is appended to one of the extents coupled to a data parity segment as required by the claim.

6. With respect to claim 17, in addition to the deficiency of claim 16, the placement of the second segment conflicts with claim 16.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 2, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claims 2 and 6 recite the limitation “said parity segments”. The parent claim recites “parity segments” and “a second parity segment” both of which are stored. It is not clear whether “said parity segments” refer to the first mentioned “parity segments” only or includes the “second parity segment”. If “said parity segments” was meant to represent the first mentioned parity segments, it is suggested that the limitation be changed to “first parity

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segments” to clearly distinguish them from the second parity segment. For the purposes of this examination, the limitation will be interpreted as more than one of any of the parity segments including the second parity segment.

10. Claims 2, 4 – 6, recite the limitation “said second parity segments”. The parent claim recites “a second parity segment”. There is insufficient antecedent basis for the plural version of the limitation in the claim.

11. Claim 5 recites the limitation “said parity segments step further comprises the step ...”. There are two storing steps in the parent claim. It seems that this claim is either combining the two previously claimed steps or adding another step of storing the second parity segment.

12. Claims 7 and 9 recite the limitation “said generating step”. There are two generating steps in the claim. It is not clear which one of the two “generating steps” this limitation refers to.

13. Claim 9 recites the limitation “said generating said parity segments”. There are two parity generating steps in the claim. It is not clear whether this limitation refers to the first “generating parity segment” step or both of the parity generating steps. The examiner notes that the specification does not support the first interpretation as the parity for the last extent is generated in the second step. On the other hand, the second interpretation is problematic as well because of its ambiguity, especially in light of other claims, for example, claim 4, that further limit a specific step.

14. Claims 28 – 39 recite the limitation “user access to the at least one file”. There is insufficient antecedent basis for the plural version of the limitation in the claim. These claims would make more sense if the depended from claim 27, instead of claim 7.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

16. Claims 1 – 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Han *et al.* (US Patent No. 6,158,017, hereinafter “Han”).

17. With respect to claim 1, Han discloses a method for storing data on an array of disk drives, comprising:

dividing extents (figure 3, d0 – d4) of data into data segments (b0 – b5);
defining a parity group (figure 3 horizontal parity group and diagonal parity group),
comprising at least one data segment from a plurality of data segments from different extents;
generating parity segments from said data segments in said parity group (figure 3,
horizontal parity blocks and diagonal parity blocks);

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storing said parity segments;
generating a second parity segment from said parity segments (horizontal and diagonal parity block at b3,d0, see also figure 7, H5 and D0); and
storing said second parity segment.

18. With respect to claims 2 – 9, see figure 7.

19. With respect to claim 10, Han discloses a method for reconstructing data from a failed disk as claimed, in figure 19 and col. 8, line 4 – col. 10, line 40, with a specific example.

20. With respect to claim 11, as shown in figure 1, buffers are in between the disks and the host computer. All storage and retrieval must go through the buffers.

21. With respect to claim 12, Han discloses an apparatus for storing data comprising:

a plurality of disk drives formed into a parity group (figure 7) having m-data extents (N=7 extents), wherein each disk drive comprises 1/m data extents (1 extent per disk) further divided into p-data segments (col. 2, line 64 – col. 3, line1);

m-1 parity segments respectively coupled to m-1 data extents (D1 – D5); each m-1 parity segment storing parity information corresponding to m-data segments sequentially positioned across the m-data extents located on different disk drives in the parity group; and

a second parity segment containing parity information for the m-1 parity segments and coupled to one of the m-data extents (H5).

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22. With respect to claim 13, said parity group further comprises mp- data segments (col. 2, line 64 – col. 3, line1).

23. With respect to claims 14 – 16, see figure 7.

24. With respect to claim 17, said second parity segment is appended to the m^{th} data extent (the parity segment is appended to the m^{th} extent from the right).

25. With respect to claims 18, 20 – 22, Han discloses an apparatus for storing data on an array of disk drives, comprising:

means for defining at least one parity group (figures 3 and 7, the entire matrix) from said array of disk drives;

means for dividing extents (d0 – d6) of data from said at least one parity group into data segments (b0 – b5);

means for generating parity segments (D1 – D6) from said data segments in said parity group;

means for generating a second parity segment (H5) from said parity segments, wherein said parity segments from said data segments and said second parity segment are attached to different data extents in the parity group.

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26. With respect to claim 19, the means for defining at least one parity group further comprises apportioning said array of disk drives into equally sized parity groups each having an equal number of disk drives (figure 3, the array or the parity group is further subdivided into horizontal and diagonal parity groups each of equal size and having an equal number of disk drives).

27. Claim 23 is rejected under 35 U.S.C. 102(e) as being anticipated by Allegrezza (US Patent Pub. No. 2002/0157113).

Allegrezza discloses a method for recovering data from a failed disk drive in a disk array comprising a plurality of disk drives (figure 3), said plurality of disk drives having a plurality of extents (stripes) apportioned equally into a plurality of parity groups (stripes), said method comprising:

striping data from at least one file sequentially across the plurality of extent of the plurality of parity groups (figure 3, see directory structure);

identifying a failed parity group containing the failed disk drive (page 3, paragraph 44.);

outputting, in realtime to users in a normal disk access mode, said data from parity groups without the failed disk drive (page 3, paragraph 43);

reconstructing, in a parity correction mode of operation, said data from the at least one failed parity group (page 3, paragraph 46); and

outputting, in realtime to the users in the failed parity group, said reconstructed data .

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Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. Claims 23 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talagala *et al.* (US Patent Pub. No. 2002/0161972, hereinafter “Talagala”).

30. With respect to claim 23, Talagala discloses a method (page 1, paragraph 8) for recovering data from a failed disk drive in a disk array comprising a plurality of disk drives (figure 4), said plurality of disk drives having a plurality of extents (stripes) apportioned equally into a plurality of parity groups (stripes), said method comprising:

striping data sequentially across an extent (figure 4, a stripe) of a parity group (a stripe);
identifying a failed parity group containing the failed disk drive (all parity groups contain failed disk drive if a disk drive fails);

outputting, in realtime to users in a normal disk access mode, said data from parity groups without the failed disk drive (data from parity groups stored in the normal drives are output in a normal access mode, without data from the failed drive);

reconstructing, in a parity correction mode of operation, said data from the at least one failed parity group (reconstruction of data from the failed drive is a well known operation); and

outputting, in realtime to the users in the failed parity group, said reconstructed data .

However, Talaga does not specifically disclose striping of data from at least one file across the plurality of extents of the plurality of parity groups. On the other hand, it would have been obvious to one skilled in the art at the time the invention was made to recognize that if the file to be stored is larger than can be contained in one stripe unit, multiple stripe units would have been necessary to store such a large file. One skilled in the art would have been motivated to store a file in a plurality of stripe units in order to make the system usable with large files.

31. With respect to claims 24 and 25, said striping step further comprises:

dividing each extent in each parity group into a plurality of data segments (figure 4, a stripe is divided into blocks or stripe units);

storing data information in the plurality of data segments ($A(0) - A(3)$); and

forming a plurality of parity segments ($C_{A0} - C_{A3}$) from the data segments in the parity group; and

appending one parity segment to the end of each extent ($P(A)$), wherein parity segments in the parity group respectively store parity information corresponding to the parity group in which the parity segments reside.

32. With respect to claim 26, one of the parity segments in the parity group is a pure parity segment (C_{PA}), which only contains parity information for other parity segments in the parity group.

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33. With respect to claim 27, the pure parity segment in the parity group is positioned at the end of the last extent in the parity group (see figure 3).

Conclusion


34. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stephanson (US 6,353,895) and Sasamoto et al. (Us Patent Pub. No. 2002/0073279) disclose other methods of recovering data from a failed disk drive.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Woo H. Choi whose telephone number is (703) 305-3845. The examiner can normally be reached on M-F, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (703) 305-3821. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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